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OCEAN COLOR OBSERVATIONS OF PHYTOPLANKTON DISTRIBUTIONS
AND PRIMARY PRODUCTIVITY

by

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The primary goal of this activity is to develop the means to assess the mean and variability of phytoplankton biomass and primary productivity on global scales.

There are three major approaches whose goals are to provide global scale observations. These are 1) processing and analysis of the complete CZCS data set in a consistent manner; 2) preparing science mission and project implementation plans for the Sea-WiFS sensor to be launched on Landsat 6 in 1991; and 3) providing guidance to EOS flight projects for ocean color observations using the MODIS sensor planned for the Polar Platform in the mid 1990's.

The analysis of the CZCS data set is being conducted in collaboration with other ocean color investigators here at GSFC and at the University of Miami. This processing presents the first consistent view of phytoplankton pigments on global scales, and analysis of this temporally undersampled data set is proving very instructive in specifying mission requirements for Sea-WiFS and future algorithm development. We have begun an error assessment of the application of simple satellite pigment - primary productivity relationships when used with such observations. This is limited to a zonal analysis to overcome

spatial undersampling on monthly scales. Satellite ocean color algorithm refinement and more rigorous quality assessment, while keeping the relationship between satellite pigment and primary production constant, have increased global estimates of ocean productivity to 62 Gigatons carbon per year, an increase of nearly 20% over estimates derived from initially processed data.

Present relationships between satellite ocean color and in-situ bio-optical processes will be tested further during the JGOFS 1989 Spring Bloom Experiment in the North Atlantic. We are assisting with the required airborne ocean color remote sensing support for this experiment to both provide improved spatial sampling for the ship study as well as to begin development of ocean color algorithms which make use of the improved SeaWiFS sensor bands.

Application of the CZCS and future SeaWiFS data to address scientific questions requires close coordination with a number of non-NASA research programs. We therefore devote a significant fraction of our effort serving on review panels and steering committees. These include the NAS CO2 Panel, the GOF S Science Steering Committee, NSF GOF S Relevancy Review Panels, the Marine Pollution Task Force (also known as the Bradley Committee), the Science and Technology Advisory Committee Remote Sensing Working Group of the Chesapeake Bay Consortium, and the ONR Special Research Initiatives Review Panel.

In coordination with investigators from the Chesapeake Bay

Consortium, we will conduct remote sensing overflights of research and monitoring cruises this summer using the Ocean Data Acquisition System (ODAS) on the Virginia Institute of Marine Science's aircraft. The ODAS, developed under joint NOAA and NASA funding, provides real-time output of chlorophyll pigment and surface temperature to a ship station. If the curvature algorithm which enables the real time computation is found sufficiently accurate for the Bay, the potential for "operational" use of the sensor by CBC will be established.